

# Kaiy Muhammad

443-979-6749 | [kkm4289@rit.edu](mailto:kkm4289@rit.edu) | [linkedin.com/in/kaiy-muhammad](https://linkedin.com/in/kaiy-muhammad)

## EDUCATION

<b>Rochester Institute of Technology</b> <i>Bachelor of Science in Computer Science, GPA 3.7</i>	August 2020 – Expected December 2024 Rochester, NY
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## RESEARCH

<b>Summer Research Program</b> <i>MIT Lincoln Laboratory – Robotics Research</i>	May 2024 - August 2024 Boston, MA
• 3D Reconstruction (NeRF, Gaussian Splatting) and semantic navigation research for legged robots in collaboration with Stanford Mac Sewager's Multi-Robot Systems Lab	
<b>Undergraduate Thesis   Python, Pytorch, ROS, OpenCV</b> <i>Generalized Odometry Research Tool for Mobile Robotics</i>	January 2024 - December 2024 Rochester, NY
<b>ML Research Assistant  Python</b> <i>RIT Autonomy, Warfare, and Engineering Lab</i>	December 2022 – May 2023 Rochester, NY
• Led implementation of multi armed bandit ML models for application in autonomous connected vehicles	
• Presented research poster at Computing Sciences in Colleges Northeastern Conference (CCSCNE) 2023	

## INDUSTRY EXPERIENCE

<b>Robotic Flight Software/VnV Intern   Bash, Python, Hardware</b> <i>NASA Jet Propulsion Laboratory - Autonomous Lunar Rovers</i>	September 2023 – December 2023 Pasadena, CA
• Finalized lunar rovers for 2024 Cooperative Autonomous Distributed Robotic Exploration (CADRE) mission	
• Participated in thermal vacuum chamber (TVAC) testing	
• Developed software and internal tools including a Python script to format parameters for rover initialization and a Bash script for time synchronization	
• Troubleshooted rover operations in electronics bench testing and field testing	
• Learned F-Prime flight software framework for C++ development	
<b>VIO Navigation Co-op   C++, Python, ROS2, PyTorch, OpenCV</b> <i>KEF Robotics – Unmanned Aerial Vehicles (UAVs)</i>	January 2023 – August 2023 Pittsburgh, PA
• Implemented Kalman filter for fusing vision based state estimation with barometer and LIDAR data	
• Applied PyTorch to eliminate nonuniformities in thermal images through de-noising techniques	
• Conducted and integrated tooling for calibration of EO/IR cameras and IMUs (Inertial Measurement Units)	
• Carried out field testing and data collection trips with team of drone pilots and researchers	
• Alone spearheaded previously nonexistent downward hazard collision avoidance and trajectory recovery behavior	
• Tackled sparse and dense optical flow methods by investigating capability for motion tracking in low-contrast thermal environments	
<b>Perception Co-op   C++, Python, SQL, ROS1/ROS2, OpenCV</b> <i>Nauticus Robotics – Autonomous Underwater Vehicles (AUVs)</i>	January 2022 – August 2022 Houston, TX
• Replaced object detection algorithm with YOLOv5 for a 6% increase in Mean Average Precision (mAP) score	
• Trained object detection model using KubeFlow and Git CI/CD pipelines	
• Integrated 3D Reconstruction algorithm into ROS for UAV mapping	
• Implemented script hashing images into comparable bit string in order to deduplicate perception training data	
• Pipelined training of 3D pose estimation system automating hours of work	
• Made interactive RVIZ simulation used for DARPA demo to visualize detected objects in robotic knowledge-base	
• Proposed and implemented in C++ a reworked underwater orbit behavior used to inspect detected objects.	

## TECHNICAL SKILLS

**Languages:** C++, Python, Bash

**Libraries/Frameworks:** ROS/ROS2, OpenCV, GTSAM, PyTorch

**Developer Tools:** Docker, Git, Linux, Gazebo, LATEX

**CAD and Hardware:** AutoCad, Arduino, Raspberry Pi, Autodesk Eagle, Autodesk Fusion